PUMA GT2100 series

Global Standard Turning Center

Doosan Machine Tools

Optimal Solutions for the Future

PUMA GT2100 series

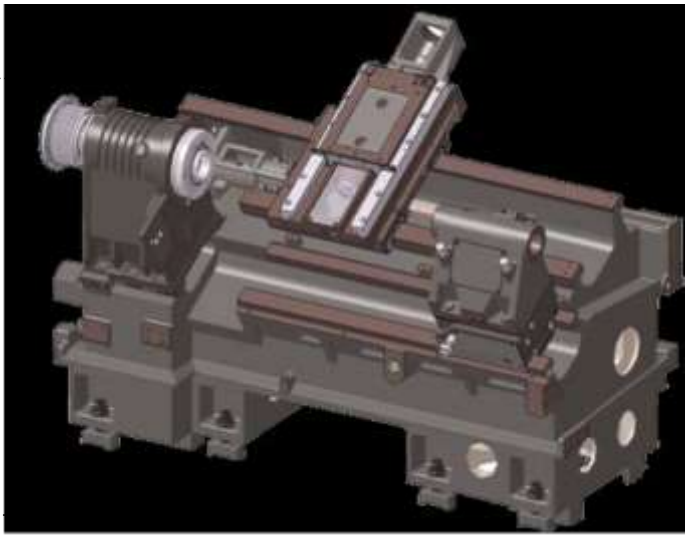
PUMA GT2100 is a Global Standard Turning Center created with DOOSAN's vast experience and technical prowess to become the world's leading turning center on the market.

Global Standard Turning Center

Features:

Enhanced Productivity with High Speed, High Rigidity Structure

- Tool service life is further extended by a high rigidity, low vibration structure design
- Higher spindle acceleration/deceleration and shorter tool replacement time



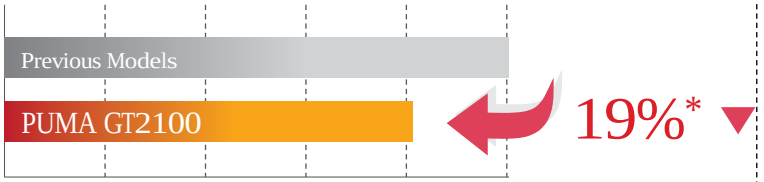
2 Easy and Convenient Operation

- Compact installation and user-oriented design guarantees excellent accessibility, operability, and maintainability

3 Eco-Friendly Design, Minimized Owner's Cost

- Automatic power off/shutdown and LED lighting in addition to minimized power consumption rate of major units
- New concept in oil-water separation extends service life of cutting fluid

Power Consumption



* Based on data from manufacturer self-testing

High Speed, High Rigidity Structure

The bed optimized with computer analysis provides high-level of rigidity by application of box type guideway. Productivity has been enhanced by higher spindle acceleration/deceleration and shorter tool changing time.

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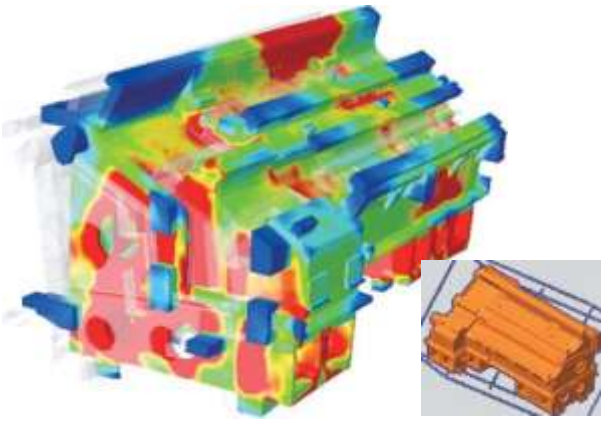
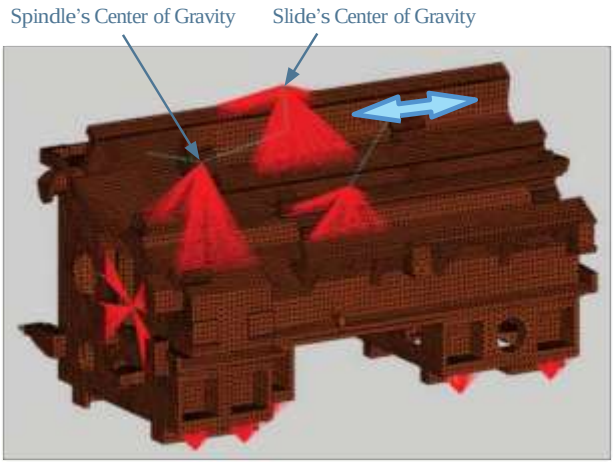
High Rigidity Bed

Cast design optimized with 3D computerized analysis has successfully increased natural frequency by as much as 42% compared to previous models. Stable cutting performance with minimized cutting vibration has been achieved in addition to extended tool service life.



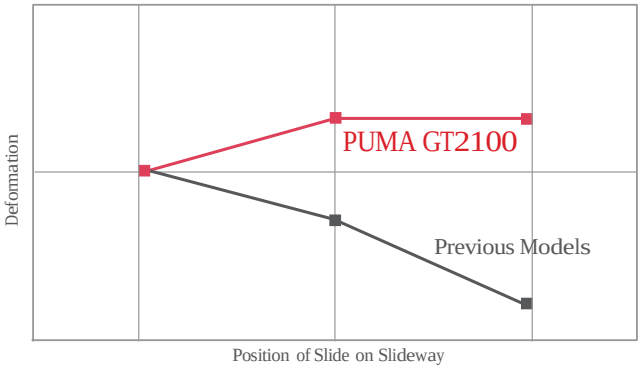
Wide ribs and a box-type slideway further reinforce bed rigidity. The distance between cutting point and slideway ensures an optimized layout to minimize vibration.



Comparison of Bed Rigidity

Stable rigidity is provided by an optimal cast design that has increased natural frequency by 42% compared with previous models.

Comparison of Bed Slideway Deformation by Carriage Position



Up to 3 times higher static rigidity than previous models

Spindle Motor ▶ 18.5 kW

Max. Spindle Speed ▶ GT2100/M 4500 r/min

GT2100B/MB 3500 r/min

Rapid Travel Speed ▶ X-axis 24 m/min (944.9 ipm)

Z-axis 30 m/min (1181.1 ipm)

High Rigidity, Low Inertial Spindle

An optimized spindle overhang design has minimized the rotational inertial load, enhanced rigidity, and shortened acceleration/deceleration time.

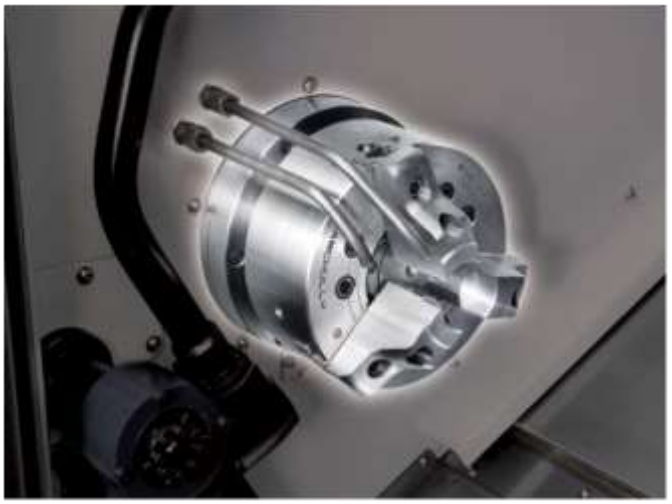
Previous Models

4.37/3.38 s

PUMA GT2100

3.79/3.18 s

Note: Spindle acceleration/deceleration times are based on the same drive motor
(0 → Max, Max → 0)



High Rigidity Feeding Structure

The optimized feeder layout in addition to a feeder design with a low center of gravity produces stable feed at high travel speed and soft feed at low travel speed. A newly designed turret driven with a high-efficiency servo motor guarantees powerful machining and stable tool change performance at high speed.

0.15 s

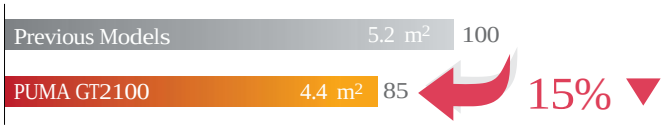
Note: Indexing time (1 station swivel)

Easy and Con
Operation

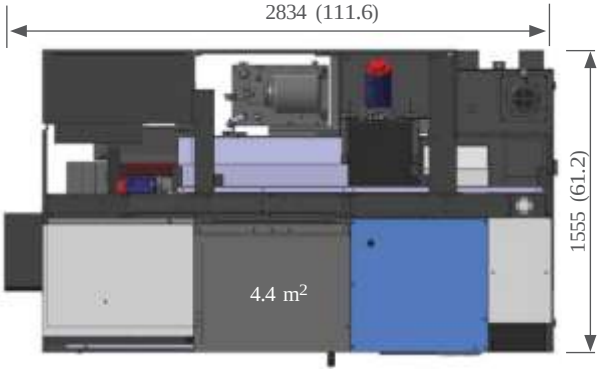
Ease of operation and convenience has been significantly improved with an ergonomic, modular design. A compact design structure allows for higher levels of productivity in a smaller space.

Maximizing Available Space

Installation area has been reduced by 15% from previous models.



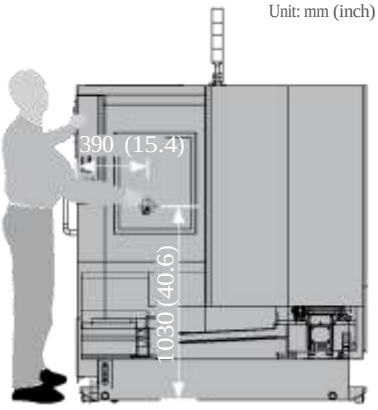
Unit: mm (inch)



Comfortable Accessibility

Access to the tool post is optimized for the operator's convenience.

Unit: mm (inch)



EZ function

Simple tool setter function which memorizes the previous fix position of the tail stock ensuring that the carriage moves to the fixed tail stock position automatically whenever necessary.

EZ automatic tail stock function

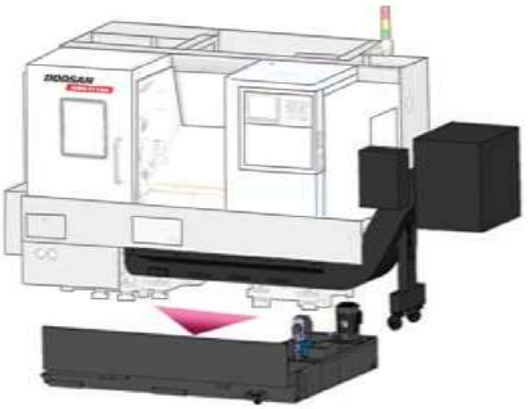
The Z axis can monitor the position of the tail stock. When the tail stock has been moved, the Z axis can be moved to the fixed tail stock position by pressing a button on the control panel. This makes the task of positioning the tail stock much easier.

EZ tool setter function

When a tool touches the tool setter in automatic or manual mode, the necessary axis comes forward at a constant speed to touch the tool and returns automatically.

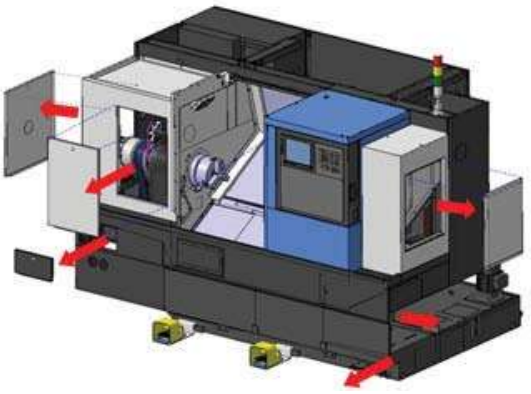
Easily Cleaned Coolant Tank

The coolant (cutting fluid) tank can be drawn out without removing the chip pan and conveyor. The user can clean the tank easily.



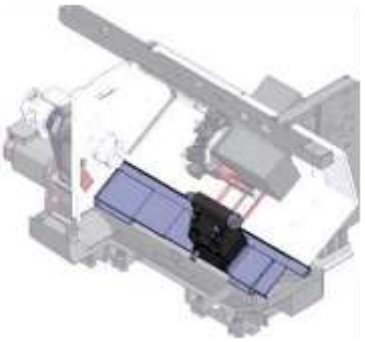
Excellent Maintainability

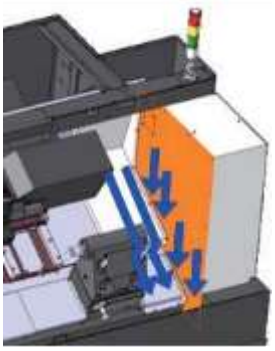
The cover has been redesigned to be easily removed for convenient service access.



Full Sliding Cover

Application of a full cover is to prevent the heat of chips from being transferred to the bed and guideway. The guideway can be protected and chips can be removed easily.



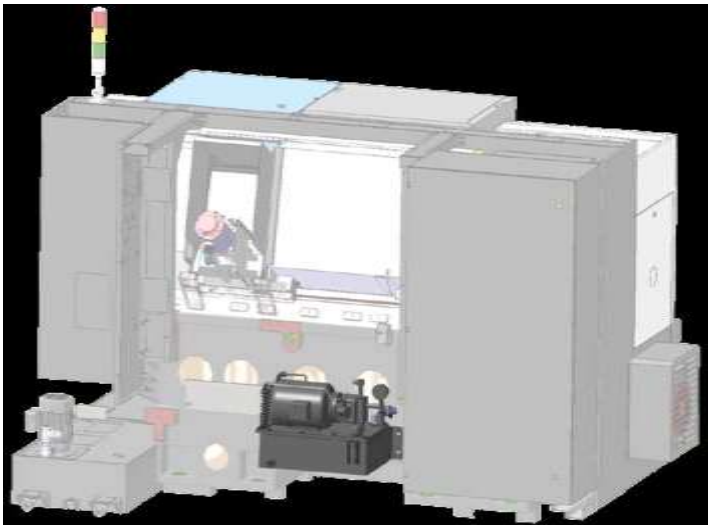


Eco-Friendly Design to Reduce Costs

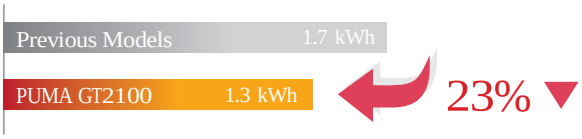
Enhanced energy efficiency lowers operating costs and protects the environment

Hydraulic Unit

Energy-saving, eco-friendly unit is 23% more efficient compared with previous models.



Power consumption (2Hr)

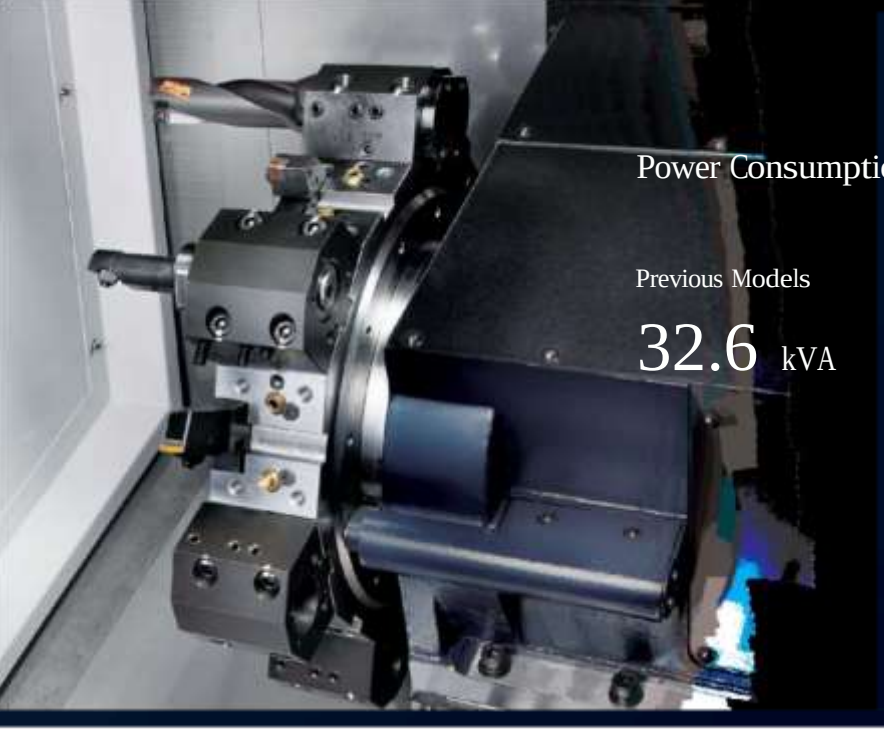


LED Work Light and Signal tower

LED lamps provide high energy efficiency even at low voltage and have more than 10 times the lifespan of halogen lamps.

LED Work Lamp

LED Signal tower Option



Power Consumption

Previous Models

32.6 kVA

PUMA GT2100

29.4 kVA

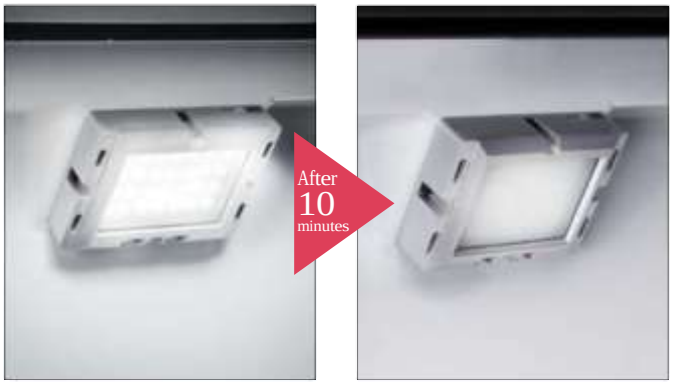
10% ▼

Automatic Light Switch

The work light automatically turns off after 10 minutes of no switch operation on the operator's panel.

Work light ON

Work light turns off automatically



Automatic Shutdown Function

If there has been no switch operation input on the operator's panel for 10 minutes, the spindle, servo motor, chip conveyor motor, and coolant tank motor, are all automatically shut down to save energy and protect the machine.

Coolant tank motor stops

Spindle, servo motor stop

Chip conveyor motor stops

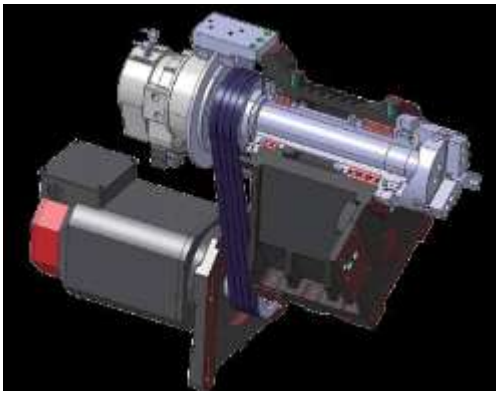
Oil Skimmer Option

A new oil skimmer with excellent oil-water separating performance extends coolant service life. Dust is minimized to improve the work environment.

Basic Mechanism

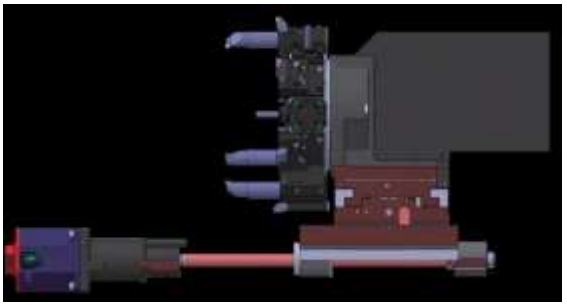
Spindle

The optimized spindle overhang design has minimized rotational inertial load, enhanced rigidity, and shortened acceleration/ deceleration time. In addition, the front bearing (a high-speed, high-precision, angular ball bearing) minimizes heat generation and enables stable spindle drive even after long, high speed operation.



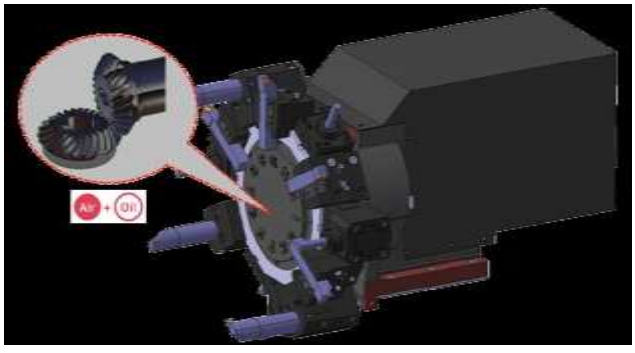
Slide

Stable feed of the slide is achieved by a low-inertial design with a low center of gravity. The axis is driven by a large diameter, high precision ball screw supported by high precision bearings in addition to employing a double-anchor pretension system that minimizes thermal expansion at high speed, high accuracy, and high rigidity.



New Tool Post Concept

The tool post driven by a high-efficiency servo motor provides greater reliability with a reduced number of parts. The tool drive with a minimized number of parts is cooled with air and oil, thus generating much less heat. Noise from the bevel gear is significantly reduced to enable long periods of milling work at high speed, thus improving both productivity and accuracy.



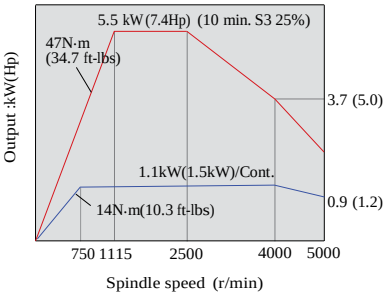
High Reliability BMT Turret (PUMA GT2100M)

The BMT55P tooling is strongly fixed to the turret with four bolts and keys to provide powerful machining performance with high efficiency, high rigidity, and a high precision internal drive system. Stable performance is guaranteed even after extensive milling work.

Max. speed of rotating tool
5000 r/min

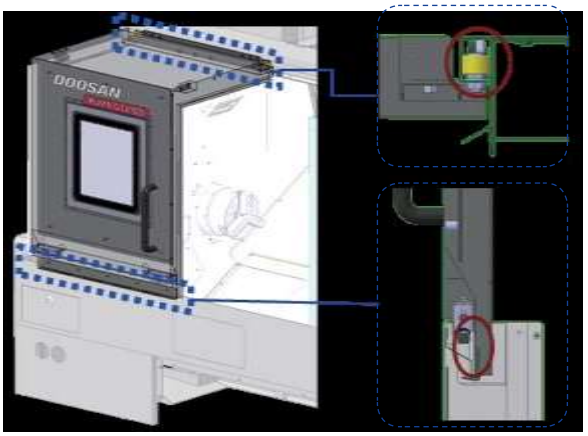
Max. power output of rotating tool
5.5 kW (7.4 Hp)

Max. torque of
47 N·m
(34.7 ft-lbs)



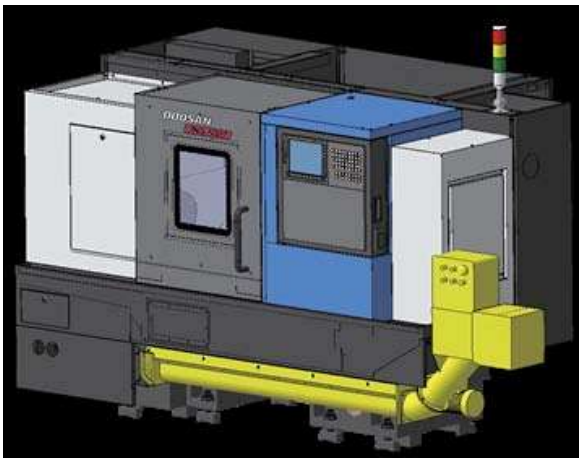
Splash Guard

The front door is provided with safety devices on the upper and lower guide to protect the operator. The door remains firmly on the machine even in an emergency situation.



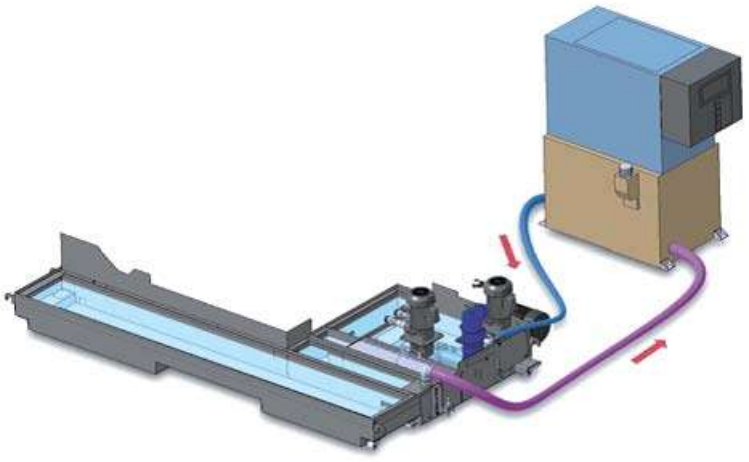
Screw type Chip conveyor Option

The length of protrusion is reduced by as much as 20% than those of conventional chip conveyors to optimise available space. The chips are compressed and discharged by a screw reduced by more than 75% in volume. Easy handling of the chips is possible as the coolant is not discharged with the chips. The direction of chip discharge can be selected to backward-right or backward as appropriate.



Coolant Chiller Option

Heat generated from cutting is transferred to the machine, which causes thermal deformation and deterioration in machining accuracy. The coolant cooling system controls the temperature of the cutting fluid to minimize thermal deformation and maintain high machining accuracy. The system is highly recommended for high-pressure cutting fluid pumps or non-water-based cutting fluid to achieve high-accuracy machining.

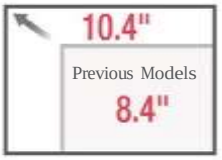


Easy CNC Set-up and EOP

Easy Set-up

Operating Console

1. Doosan-Fanuc i series
2. 10.4" color TFT LCD monitor
   Large 10.4" LCD screen showing error messages of the machine and controller improves operator's work convenience.
3. PCMCIA Card
4. USB Port
5. Ethernet Connectivity (embedded)
6. Swing-type Panel
   The operation panel can swing up to 88° to provide the operator with convenience during work.



EOP (Easy Operation Package)

Programming

G Code List

Description of G Code can be displayed on the screen when necessary.

M Code List

Description of M Code can be displayed on the screen when necessary.

Calculator

Automatic calculation including cutting size and conditions.

Operation / Maintenance

Tool Load Monitor Option

To prevent mechanical damage when feeding, the wear or fracture of tools is detected according to pre-set load limits of the spindle and shafts.

Operation Rate - User Log In

The function to measuring and monitoring the rate of machine operation.

Back Up Custom Data

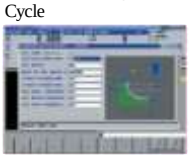
The function to save the acquired load information per item from the tool load monitor to the tool table. Information stored can be reloaded for use in the tool load monitor.

Interactive Programming

The「EZ Guide i」supports the entire operation of the NC machining tool from programming, to checking by animation, to processing after programming including tool compensation and coordinate system measurement, and the inspection of finished parts. Program error can be identified by animation. The ISO code programming is the most popular type for NC machine tools enhanced compatibility with CAD/CAM.

Integrated Operation Window

Lathe Machining Cycle



Actual Processing Simulation

Tool Data Management Function

High Performance

PUMA GT2100 Series provides high machining performance in a wide variety of cutting processes.

OD Turning

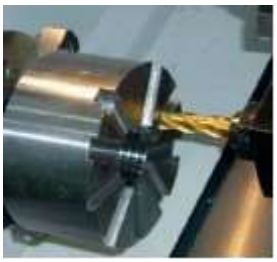
Carbon steel (SM45C)

	unit	PUMA GT 2100
Chip removal rate	cm^3/min ($inch^3$/min)	551 (33.6)
Cutting speed	m/min (ipm)	210 (8267.7)
Feedrate	mm/rev	0.55
Spindle speed	r/min	965
Cutting depth	mm (inch)	4.5 (0.2)

U-drill

Carbon steel (SM45C)

	unit	PUMA GT 2100
Chip removal rate	cm^3/min ($inch^3$/min)	472 (28.8)
Cutting speed	m/min (ipm)	200 (7874)
Feedrate	mm/rev	0.15
Spindle speed	r/min	1010
U-drill diameter	mm (inch)	63 (2.5)



End mill

Carbon steel (SM45C)

	unit	PUMA GT 2100M
Chip removal rate	cm^3/min ($inch^3$/min)	90 (5.5)
Cutting speed	m/min (ipm)	60 (2362.2)
Feedrate	mm/min (ipm)	250 (9.8)
Spindle speed	r/min	1060
Cutting depth	mm (inch)	20 (0.8)
Tool diameter	mm (inch)	18 (0.7)

Tapping

Carbon steel (SM45C)

	unit	PUMA GT 2100M
Tap size		M20 x P2.5
Cutting speed	m/min (ipm)	15 (590.6)
Feedrate	mm/min (ipm)	600 (23.6)
Spindle speed	r/min	240

Face mill

Carbon steel (SM45C)

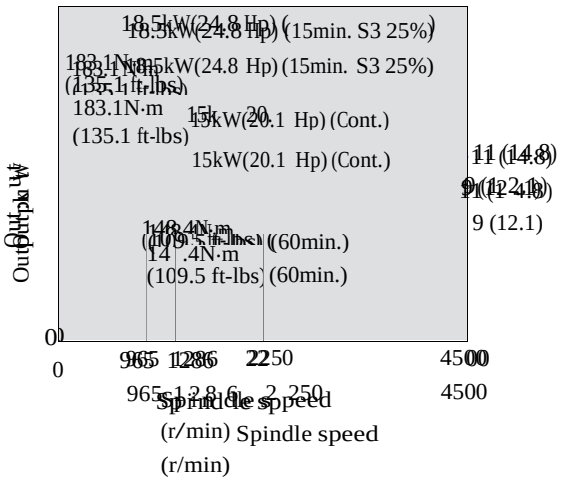
	unit	PUMA GT 2100M
Chip removal rate	cm^3/min ($inch^3$/min)	27 (1.7)
Cutting speed	m/min (ipm)	120 (4724.4)
Feedrate	mm/min (ipm)	190 (7.5)
Spindle speed	r/min	1011
Cutting depth	mm (inch)	4 (0.2)
Tool diameter	mm (inch)	63 (2.5)

- The above data is based on the manufacturer testing and may vary according to operating conditions.

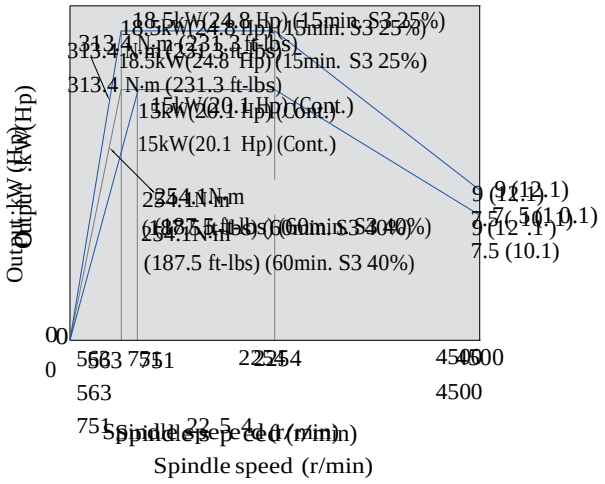
Main Spindle Power - Torque Diagram

Main Spindle Power - Torque Diagram (GT 2100/M)

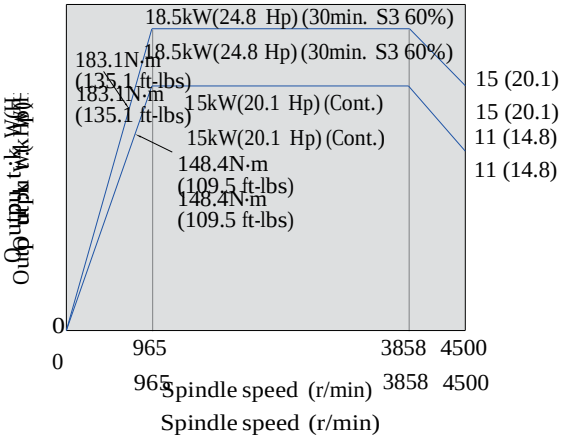
Standard



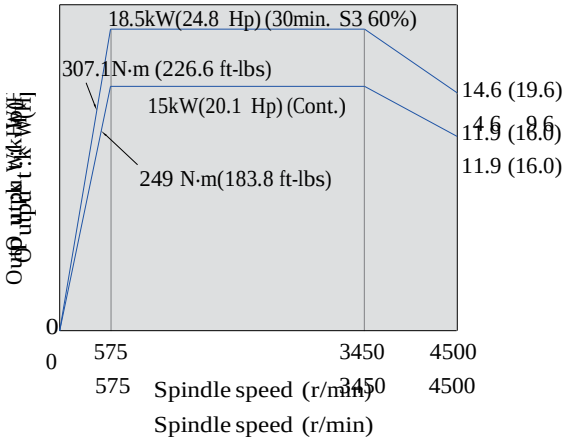
Option 1



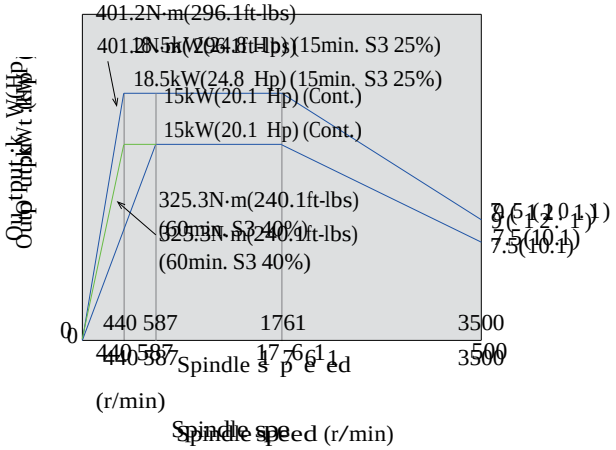
Option 2



Option 3



Main Spindle Power - Torque Diagram (GT 2100B/MB)

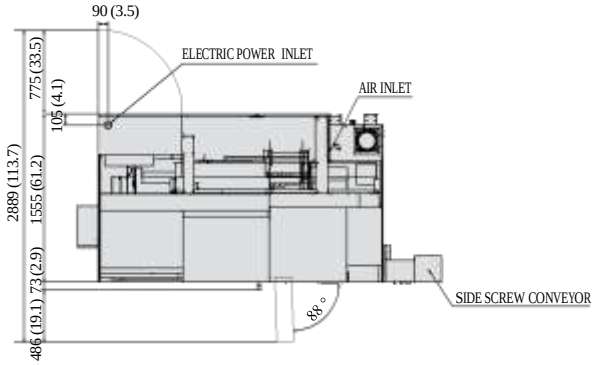


External Dimensions

Unit: mm(inch)

GT 2100/M

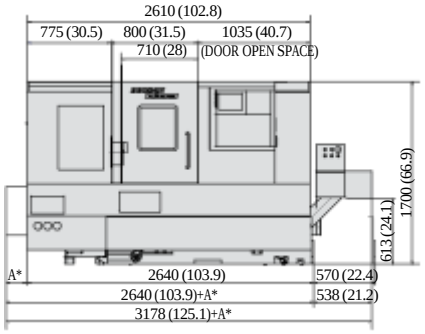
Top View



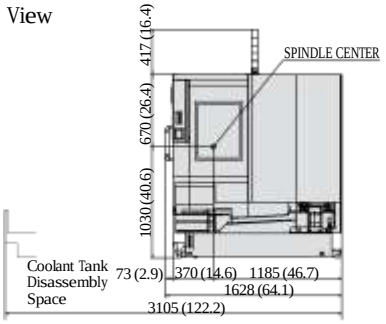
A* Length by Motors

Motor	Length "A" (mm/inch)
Standard	194 (7.6)
Option 1	295 (11.6)
Option 2	225 (8.9)
Option 3	400 (15.7)

Front View

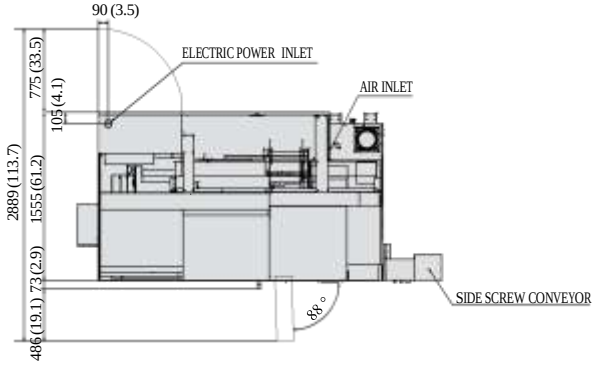


Side View

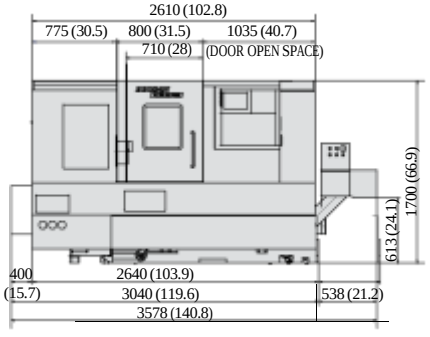


GT 2100B/MB

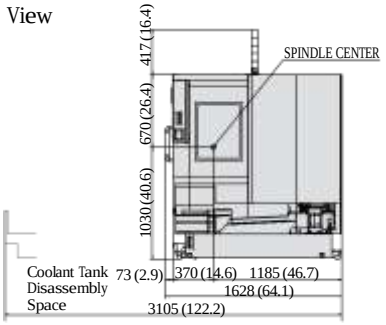
Top View



Front View



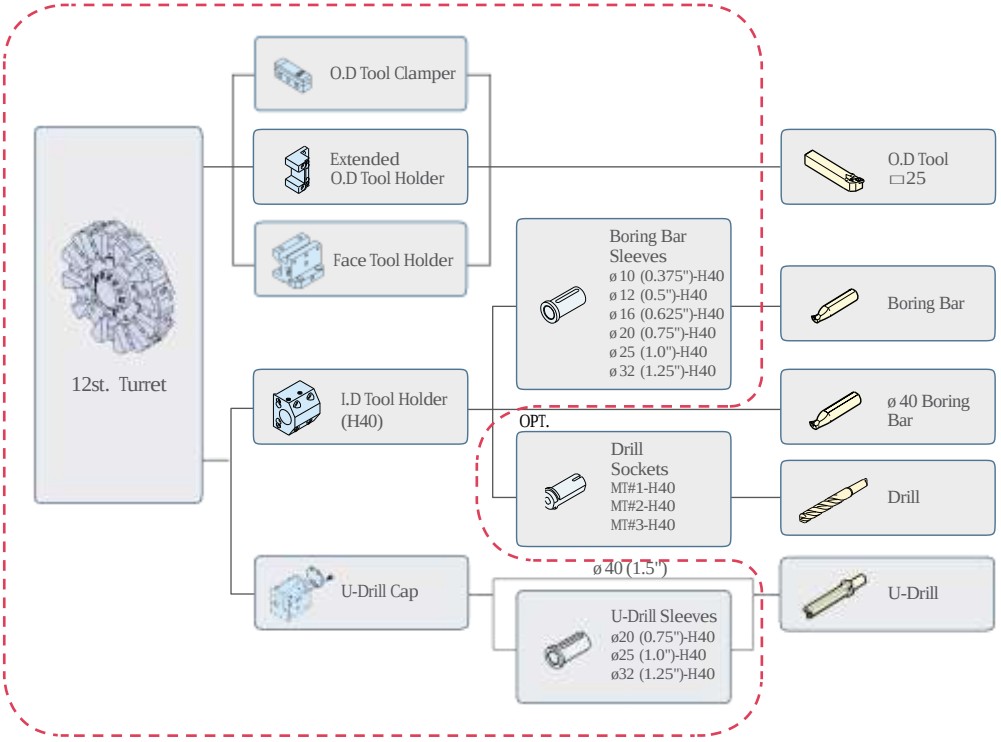
Side View



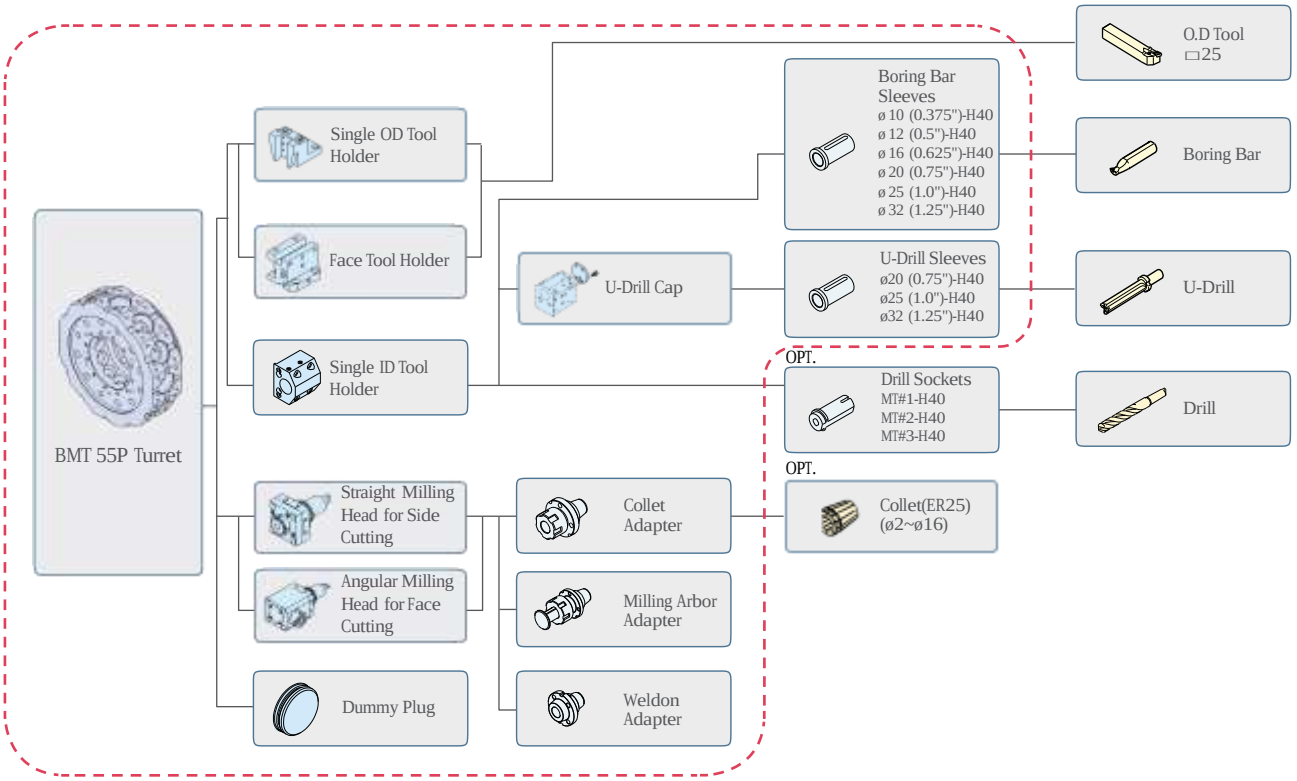
Tooling System

Unit: mm (inch)

PUMA GT2100

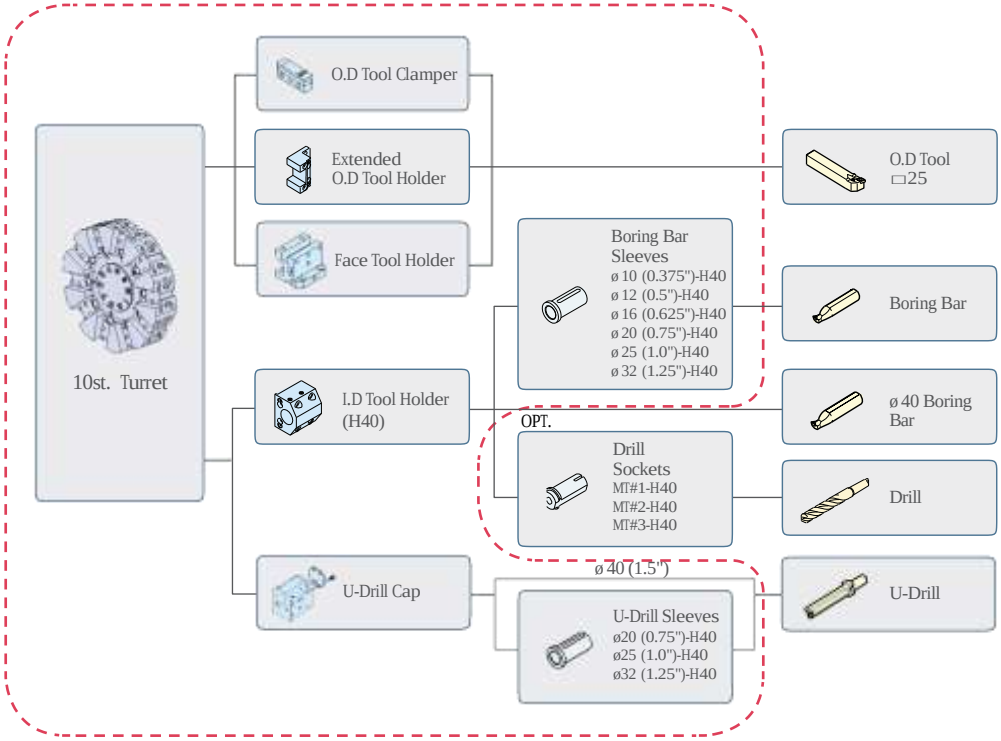


PUMA GT2100M

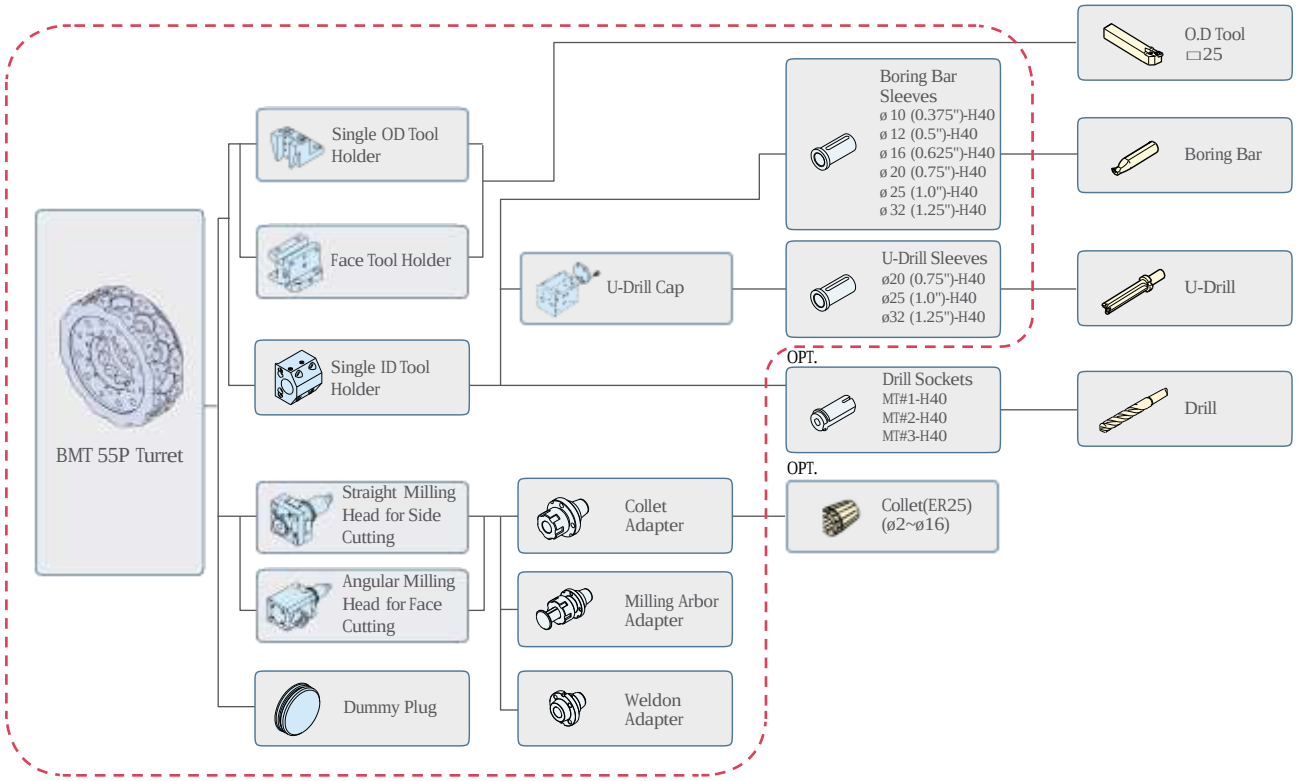


Unit: mm (inch)

PUMA GT2100B



PUMA GT2100MB



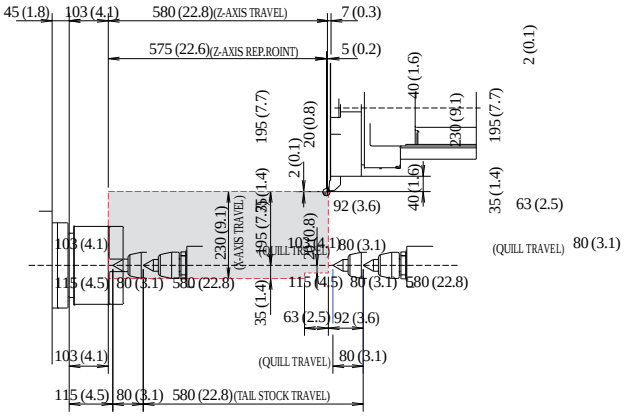
Working Ranges, Tool Interference Diagram

PUMA GT2100

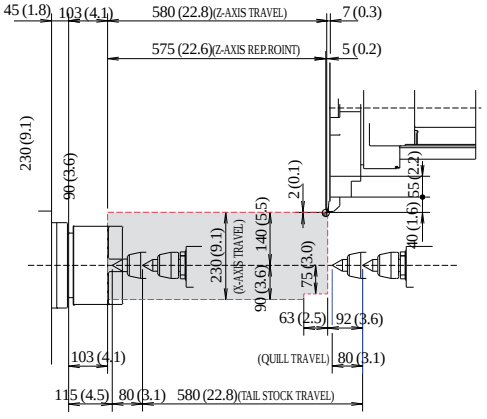
Unit: mm (inch)

Working Ranges

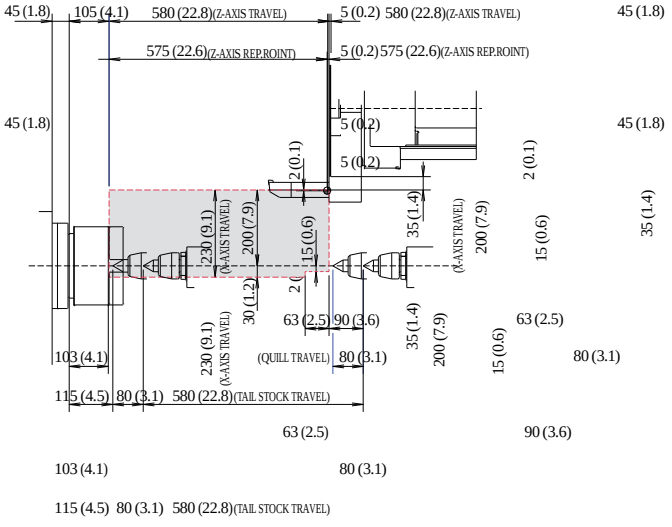
OD Tool



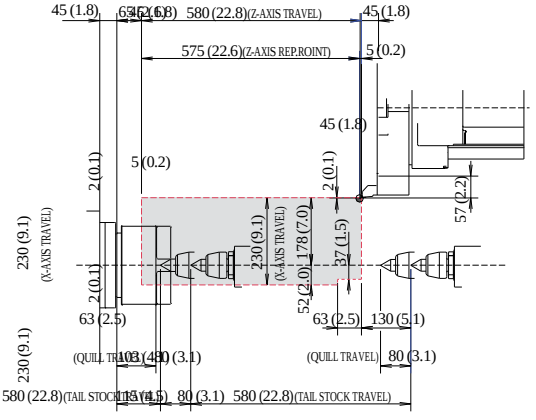
Extended OD Tool



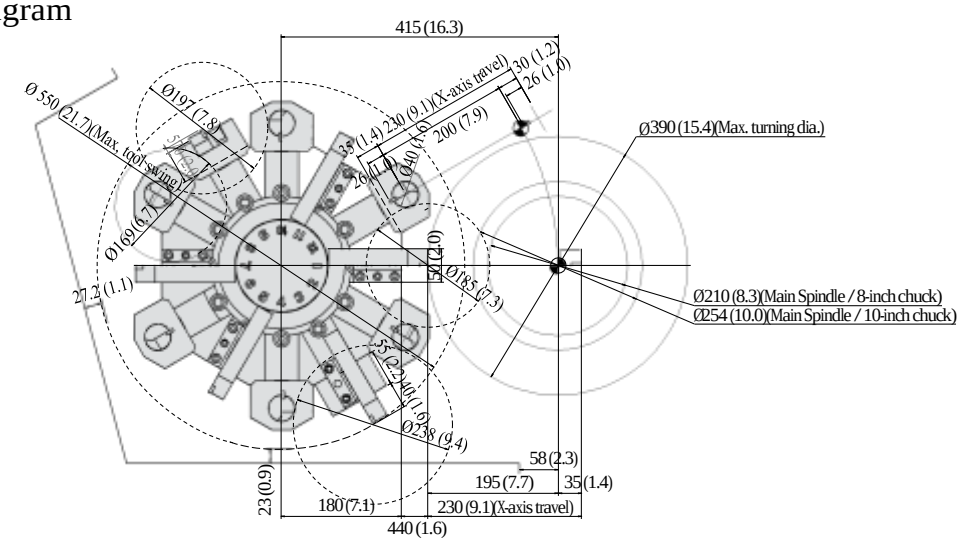
ID Tool



Face Tool



Tool Interference Diagram

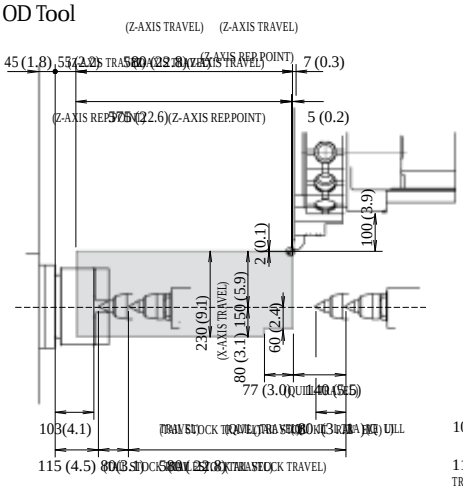


PUMA GT2100M

Unit: mm (inch)

Working Ranges

OD Tool



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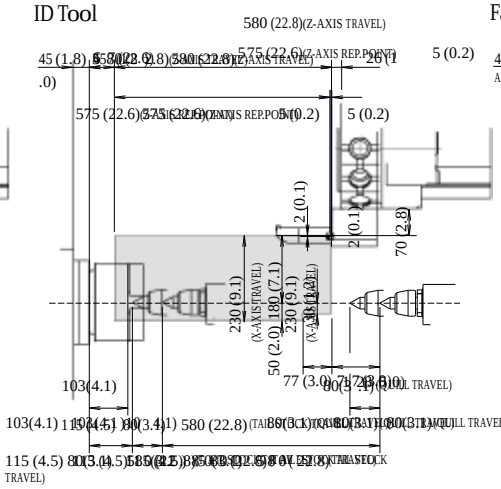
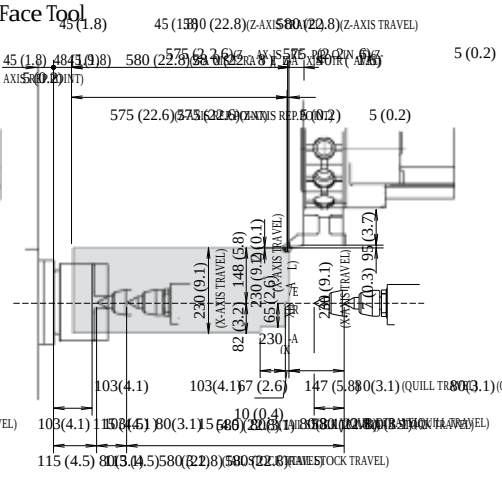
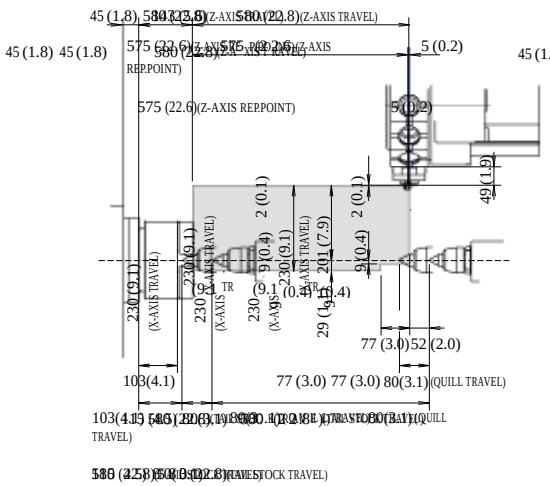


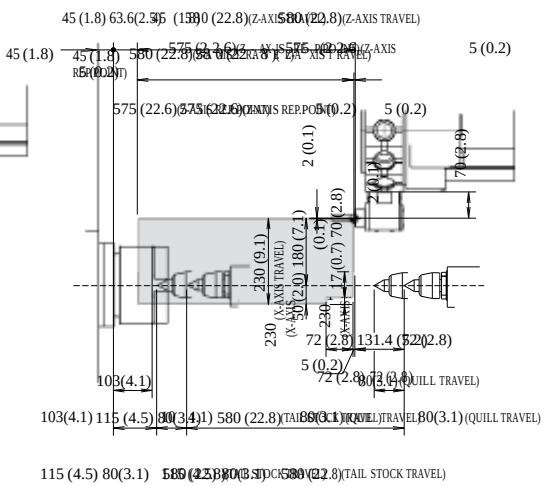
Face Tool



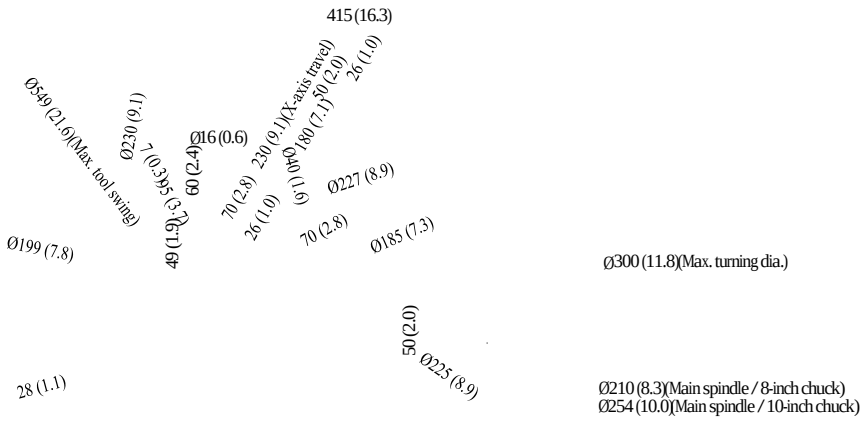
Straight Milling



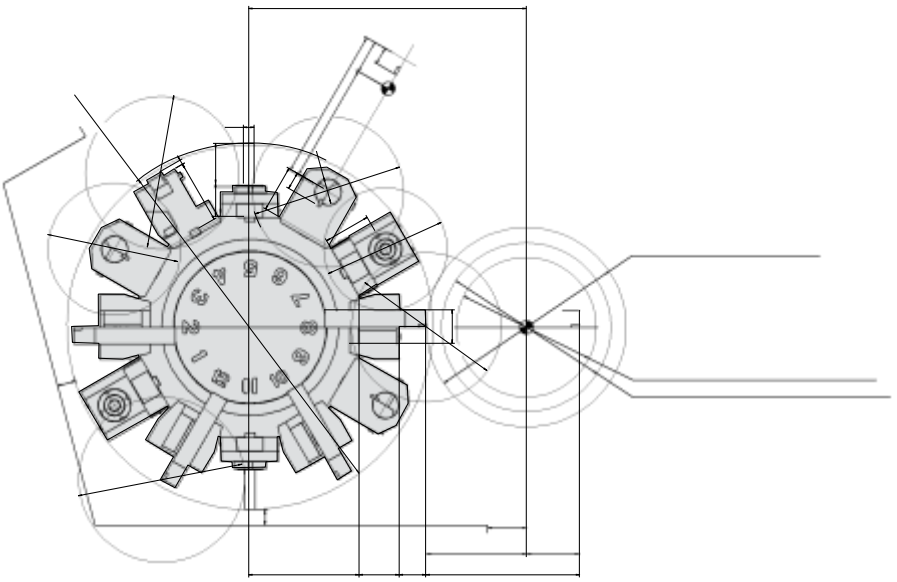
Angular Milling



Tool Interference Diagram



Working Ranges, Tool Interference Diagram

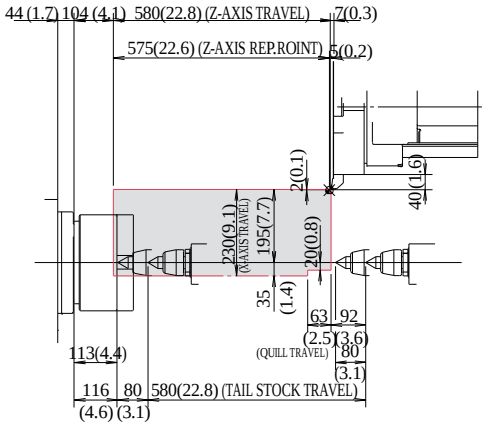


PUMA GT2100B

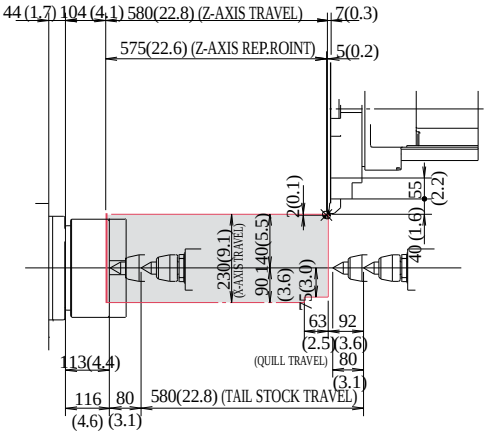
Unit: mm (inch)

Working Ranges

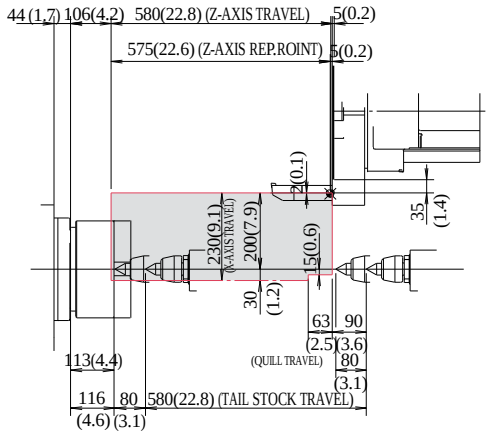
OD Tool



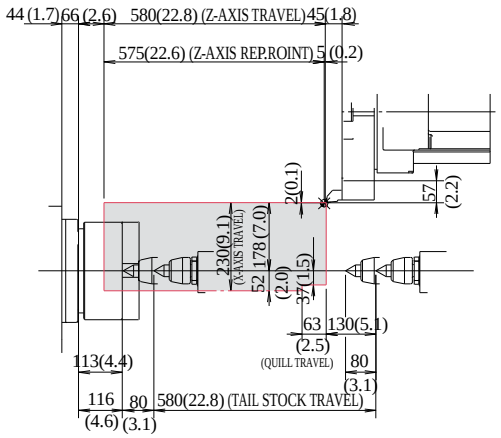
Extended OD Tool



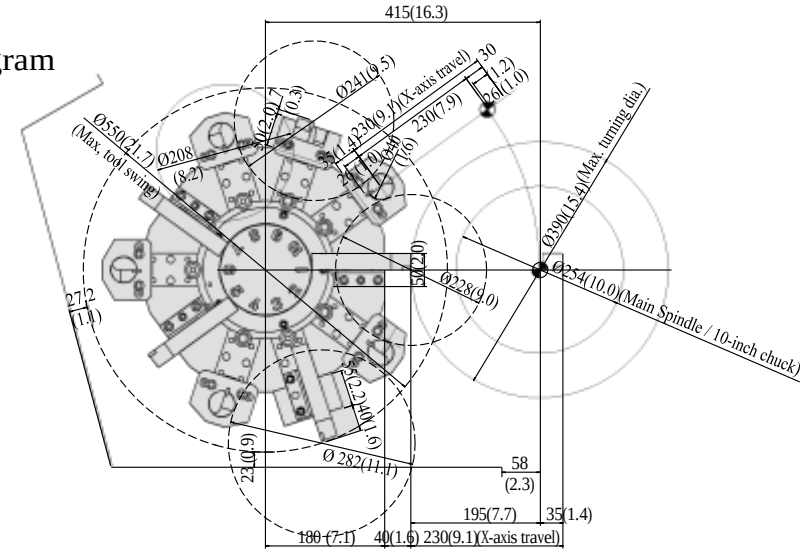
ID Tool



Face Tool



Tool Interference Diagram



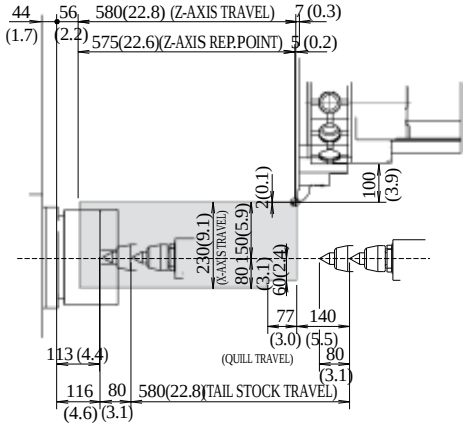
Working Ranges, Tool Interference Diagram

PUMA GT2100MB

Unit: mm (inch)

Working Ranges

OD Tool



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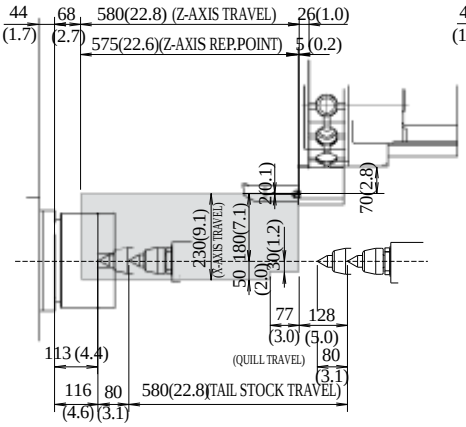
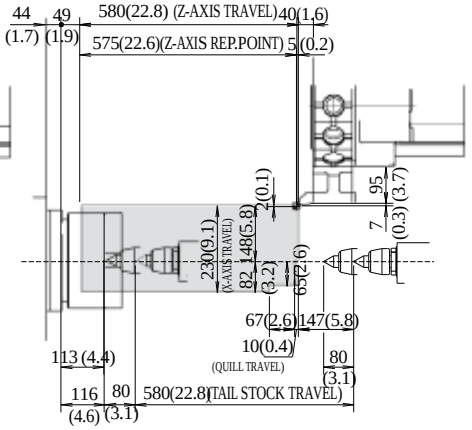
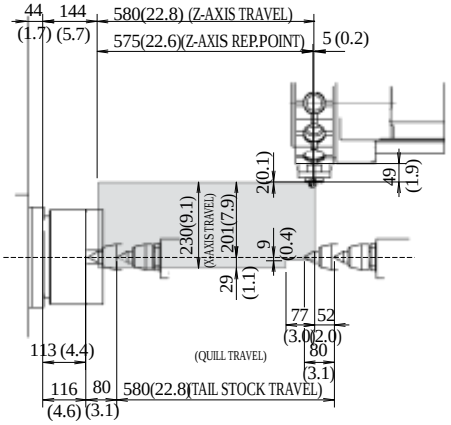


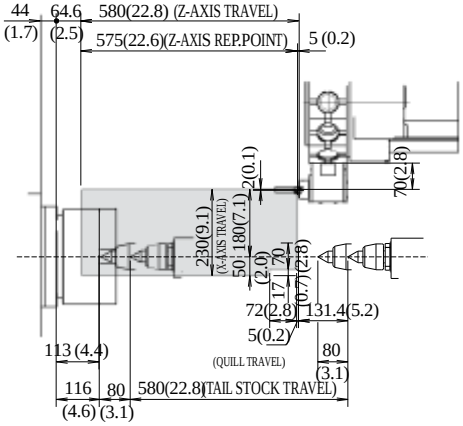
Face Tool



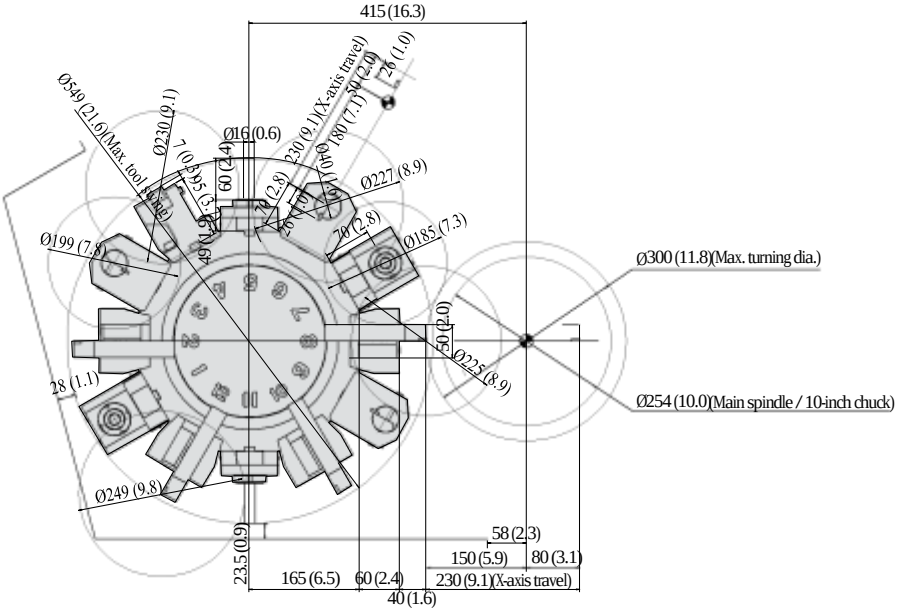
Straight Milling



Angular Milling



Tool Interference Diagram



NC Unit Specifications

DOOSAN-FANUC i series

Description			Unit	PUMA GT2100	PUMA GT2100B	PUMA GT2100M	PUMA GT2100MB
Capacity	Swing over bed		mm (inch)	600 (23.6)			
	Swing over saddle		mm (inch)	390 (15.4)			
	Recom. Turning diameter		mm (inch)	210 (8.3)	255 (10.0)	210 (8.3)	255 (10.0)
	Max. Turning diameter		mm (inch)	390 (15.4)		300 (11.8)	
	Max. Turning length		mm (inch)	562 (22.1)	550 (21.7)	513 (20.2)	501 (19.7)
	Chuck size		inch	8	10	8	10
	Bar working diameter		mm (inch)	65 (2.6)	81 (3.2)	65 (2.6)	81 (3.2)
Travels	Travel distance	X-axis	mm (inch)	230 (9.1)			
		Z-axis	mm (inch)	580 (22.8)			
		C-axis	deg	-		360 (14.2) (in 0.001)	
Feedrates	Rapid Traverse Rate	X-axis	m/min (ipm)	24 (944.9)			
		Z-axis	m/min (ipm)	30 (1181.1)			
		C-axis	r/min	-		200 (7874.0)	
Main spindle	Max. Spindle speed		r/min	4500	3500	4500	3500
	Spindle nose		ASA	A2-6	A2-8	A2-6	A2-8
	Spindle bearing diameter (Front)		mm (inch)	110 (4.3)	140 (5.5)	110 (4.3)	140 (5.5)
	Spindle through hole		mm (inch)	76 (3.0)	91 (3.6)	76 (3.0)	91 (3.6)
	Min. spindle Indexing angle(C-axis)		deg	-		0.001	
Turret	No. of tool stations		ea	12	10	12	
	OD tool size		mm (inch)	25x25 (1.0x1.0)			
	Max. boring bar size		mm (inch)	40 (1.6)			
	Turret Indexing time(1 station swivel)		s	0.15			
	Max. Rotary tool speed		r/min	-		5000	
Tail Stock	Quill diameter		mm (inch)	80 (3.1)			
	Quill bore taper		MT	#4			
	Quill travel		mm (inch)	80 (3.1)			
Motors	Main spindle motor power(30min./ cont.)		kW (Hp)	18.5 / 15 (24.8 / 20.1) *B/MB : (15min/cont)			
	Rotary tool motor power		kW (Hp)	-		5.5 (7.4)	
	Coolant pump motor power		kW (Hp)	0.4 (0.5)			
Power source	Electric power supply(rated capacity)		kVA	29.04	36.52	30.43	36.52
Machine Dimensions	Height		mm (inch)	1700 (66.9)			
	Width		mm (inch)	1628 (64.1)			
	Depth		mm (inch)	2834 (111.6)			
	Weight		kg (lb)	3500 (7716.1)		3600 (7936.5)	

Standard Features

- Automatic Door Lock
- Coolant Supply System
- Foot Switch
- Hydraulic Chuck & Cylinder
- Live Center
- Lubricant Supply System
- Parts for installation
- Soft Jaw
- Standard Work Tools (including holders)
- Work Light

Optional Features

- Additional tool holder and sleeves
- Air blast for chuck jaw cleaning
- Air gun
- Bar feeder interface
- Built-in dead center
- Chip conveyor & chip bucket
- Chuck pressure check switch
- Coolant Chiller
- Front automatic door
- Hard jaw
- High pressure coolant system
- Signal tower (yellow, red, green)
- Mist collector
- Oil skimmer
- Parts catcher
- Parts conveyor
- Pressure chucking selection function
- Programmable tail stock
- Tool setter (Manual/Hyd.)

- The specifications and information above-mentioned may be changed without prior notice.
- For more details, please contact Doosan

Machine Specifications

Axes Control

- Controlled axes	X, Z (PUMA GT2100) X, Z, C (PUMA GT2100M)
- Simultaneous controlled axes	2 axis (GT2100) 3 axes (PUMA GT2100M)
- Axis control by PMC	
- Backlash compensation	0 ~ ±9999 pulse
- Backlash compensation for each rapid traverse and cutting feed	
- Chamfering on / off	
- Emergency stop	
- Follow-up	
- HRV2 control	
- Inch / Metric conversion	
- Increment system	1/10 0.0001 / 0.00001 mm/inch
- Interlock	All axes / each axis
- Least input command	0.001 / 0.0001 mm/inch
- Machine lock	All axes / each axis
- Mirror image	
- Overtravel	
- Position switch	
- Servo off	
- Stroke limit check before move	
- Stored stroke check 1	
- Stored stroke check 2, 3	
- Torque control	
- Unexpected disturbance torque detection function	

Operation

- Automatic operation (memory)	
- Buffer register	
- DNC operation (Reader / puncher interface is required)	
- Dry run	
- Handle incremental feed	X1, X10, X100
- Jog feed	
- Manual Handle interruption	
- Manual handle feed	1 unit
- Manual intervention and return	
- Manual pulse generator	1 ea
- Manual reference position return	
- MDI operation	
- Program number search	
- Program restart	
- Reference position shift	
- Refernce position setting without dog	
- Sequence number search	
- Single block	
- Wrong operation prevention	

Interpolation Functions

- Nano interpolation	
- 1st. reference position return	Manual, G28
- 2nd. reference position return	G30
- 3rd/4th. reference position return	G30
- Circular interpolation	G02
- Continuous threading	
- Dwell (per sec)	G04
- High speed skip	
- Linear interpolation	G01
- Multiple threading	
- Positioning	G00
- Reference position return check	G27
- Thread cutting / Synchronous cutting	
- Thread cutting retract	
- Torque limit skip	
- Variable lead threading	

Feed Function

- Automatic acceleration / deceleration	
- Cutting feedrate clamp	
- Feed per minute	
- Feed per revolution	
- Feedrate override (10% unit)	0 - 200 %
- Jog feed override (10% unit)	0 - 2000 mm/min
- Manual per revolution feed	
- Override cancel	
- Rapid traverse override	F0, 25, 100 %
- Rapid traverse rate	
- Tangential speed constant control	

Auxiliary / Spindle Speed Function

- Spindle orientation	
- Actual spindle speed output	
- Auxiliary function lock	
- Constant surface speed control	
- High speed M/S/T interface	
- M - code function	M3 digits
- Rigid tapping	
- S - code function	S4 / S5 digits
- Spindle serial output	S4 / S5 digits
- Spindle speed override	0 - 150 %
- Spindle Output switching	

Program Input

- Absolute / incremental programming	
- Addition of custom macro common variables	
- Automatic coordinate system setting	
- Canned cycle for drilling / Turning	
- Canned cycle	
- Circular interpolation by R programming	
- Control in / out	
- Coordinate system setting	G50
- Coordinate system shift	
- Custom macro	
- Decimal point programming	
- Pocket calculator type decimal point programming	
- Diameter / radius programming (X axis)	
- Direct drawing dimension programming	
- Direct of coordinate system shift	
- G code system A / B / C	
- Input unit 10 time multiply	
- Interruption type custom macro	
- Label skip	
- Manual absolute on and off	
- Maximum program dimension	± 9 digit
- Multiple repetitive canned cycle	G70 - G76
- Multiple repetitive canned cycle II	
- Optional block skip	1 piece
- Parity check	
- Pattern data input	
- Plane selection	G17, G18, G19
- Program number	O4 digit
- Program stop / end (M00, M01 / M02, M30)	
- Programmable data input	G10
- Sequence number	N5 digit
- SUB program call	10 folds nested
- Tape code : ISO / EIA auto recognition	EIA RS422 / ISO840
- Tape format for FANUC Series10/11	
- Work coordinate system	G52 - G59
- Work coordinate system preset	

Tool Function / Tool Compensation

- Automatic tool offset	
- Direct input of offset value measured	
- Direct input of offset value measured B	
- Extended tool life management	
- T - code function	T2 + 2 digits
- Tool geometry / wear compensation	
- Tool life management	
- Tool nose radius compensation	
- Tool offset	G43, G44, G49
- Tool offset 7 digits	
- Tool offset pairs	64 pairs
- Tool offset value counter input	

Editing Operation

- Back ground editing	
- Extended part program editing	
- Number of registered programs	400 ea
- Part program editing	
- Part program storage length	1280 m(512kB)
- Play back	
- Program protect	

Setting and Display

- Actual cutting feedrate display	
- Alarm display	
- Alarm history display	
- Current position display	
- Directory display and punch for each group	
- Directory display of floppy cassette	
- Display of spindle speed and T code at all screens	
- External message display	
- Help function	
- Multi - language display	
- Operation history display	
- Parameter setting and display	
- Program name display	31 characters
- Run hours / parts count display	
- Self-diagnosis function	
- Servo setting screen	
- Spindle setting screen	
- Status display	
- Operating monitor screen	
- Soft operator's panel	
- Tool path graphic display	

Data Input/Output

- External data input	
- External key input	
- External program input	
- External program number search	
- External work number search	
- Memory card input / output	
- Reader / puncher interface	CH1.interface
- RS232C interface	

Others

- Cycle start and lamp	
- Display unit	10.4" Color LCD
- Feed hold and lamp	
- NC and servo ready	
- PCMCIA port in the front of LCD display unit	
- PMC system0iD	
- Reset / rewind	
- USB port in the front of LCD display unit	

Operation Guidance Function

- eZ Guide i	

Interface Function

- Ethernet function	Embedded ethernet

Auxiliary / Spindle Speed Function

Axis Control (Option)

- Controlled axes expansion (total)	Max.4 axes
- Simultaneous controlled axes expansion (total)	Max.4 axes

Feed Function (Option)

- Advanced preview control	
- Helical interpolation	

Interface Function (Option)

- Fast ethernet / Data server	

Operation (Option)

- Manual handle feed	2 units

Robot Interface (Option)

- Robot interface with PMC I/O module (Hardware between PMC I/O modules)	
- Robot interface with PROFIBUS-DP	

DOOSAN

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